

PATENT

Atty. Dkt. No. SAR 13985

REMARKS

This is intended as a full and complete response to the Final Office Action dated August 24, 2004, having a shortened statutory period for response set to expire on November 24, 2004. Please reconsider the claims pending in the application for reasons discussed below.

RESPONSE TO EXAMINER'S ARGUMENTS

The Examiner argues that Veselka teaches "the first combiner input being coupled to the modulator output 75a" and "the second combiner input being coupled to said second demultiplexer output 74b" (See Final Office Action, Section 4, lines 7-9). The Applicants assert that Veselka still fails to disclose or suggest a novel apparatus for optically generating signals using mode-locked radiation where a first output from an optical demultiplexer is modulated and a second output from the optical demultiplexer is unmodulated. However, in response to the Examiner's note that claim 1 does not specifically claim direct coupling, the Applicants have amended claim 1 to recite that the second multiplexer is directly coupled to the second demultiplexer output. Claim 5 was amended to distinctly recite that the second signal is an unmodulated signal. Claim 6 was amended to distinctly recite that the second mode is an unmodulated mode.

REJECTION OF CLAIMS UNDER 35 U.S.C. § 103

The Examiner rejected claims 1, 3, 4, 5, and 6 as being obvious over Veselka (U.S. Patent No. 5,963,567, issued October 5, 1999) (Veselka) in view of Logan Jr. (United States Patent No. 5,379,309, issued January 3, 1995) (Logan); claim 2 as being unpatentable over Veselka in view of Logan and further in view of Hohimer et al. (U.S. Patent No. 5,349,601 issued September 20, 1994) (Hohimer). The Applicants respectfully traverse the rejection.

A. Claims 1, 3, 4, 5 and 6

The Examiner rejected claims 1, 3, 4, 5 and 6 as being unpatentable over Veselka in view of Logan. The Applicants respectfully disagree.

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Veselka teaches a light source for generating many precisely spaced wave-length channels, based on the periodic modulation of light. CW light is periodically amplitude modulated and then coupled to a non-linear fiber where it undergoes additional modulation by the process of self-phase modulation or other non-linear effects.

Logan discloses two independent laser oscillators that are forced to be correlated by a mode-locked laser oscillator. The signal from the mode-locked laser is split (using an optical isolator) and injection-locked to continuous-wave ("CW") single-frequency lasers. Subsequently, the outputs from the CW lasers are combined to produce the heterodyne output signal in the microwave to submillimeter wave frequency band.

The Examiner's attention is directed to the fact that Veselka and Logan either singly or in any permissible combination fail to disclose or suggest a novel apparatus for optically generating signals using mode-locked radiation where a first output from an optical demultiplexer is modulated and a second output from the optical demultiplexer is unmodulated, as positively recited in Applicants' independent claims 1, 5 and 6, respectively. For example, Applicants' independent claims 1, 5, and 6 recite:

1. An apparatus for optically generating signals, the apparatus comprising:

(a) a mode-locked semiconductor laser that generates mode-locked optical radiation with emitted wavelengths separated by approximately 10 GHz to approximately 300 GHz;

(b) an optical demultiplexer with a demultiplexer input, a first demultiplexer output, and a second demultiplexer output, the demultiplexer input being coupled to said mode-locked semiconductor laser, wherein said optical demultiplexer serves as a wavelength separator capable of selecting a first wavelength for said first demultiplexer output and a second wavelength for said second demultiplexer output;

(c) an optical modulator having a modulator input and a modulator output, the modulator input being coupled to the first demultiplexer output; and

(d) an optical multiplexer having a first multiplexer input, a second multiplexer input, and a multiplexer output, the first multiplexer input being coupled to the modulator output, the second multiplexer input being directly coupled to said second demultiplexer output. (Emphasis added).

5. An apparatus for generating optical signals, the apparatus comprising:

(a) means for generating mode-locked optical radiation;

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(b) an optical demultiplexer for separating the generated mode-locked optical radiation into a first signal and a second signal, the first signal and second signal being separated by approximately 60 GHz;

(c) means for modulating the first signal, thereby creating a modulated signal; and

(d) means for subtracting the difference between the modulated signal and the second signal, where the second signal comprising an unmodulated signal. (Emphasis added).

6. A method for generating an optical signal, the method comprising:

(a) generating a first mode and a second mode in a mode-locked light source;

(b) separating the first mode from the second mode by using an optical demultiplexer, wherein said first mode comprises a first wavelength of a light from said mode-locked light source and said second mode comprises a second wavelength of said light from said mode-locked light source;

(c) modulating the first mode with data;

(d) combining the second mode with the modulate first mode, where the second mode comprising an unmodulated mode;

(e) downconverting the combined second mode and modulated first mode. (Emphasis added).

Applicants' invention is directed to a method and apparatus for creating modulated millimeter-wave signals, thereby providing a high data throughput rate. In one embodiment, the present invention employs an optical demultiplexer where the optical demultiplexer serves as a wavelength separator capable of selecting a first wavelength as a first demultiplexer output and a second wavelength as a second demultiplexer output. (See Applicants' specification, page 3, lines 17-27). Thus the optical demultiplexer selects a specific wavelength for one path and another specific wavelength for another path. This novel and inexpensive approach allows one wavelength traveling along a first path to be modulated with data and the second wavelength to be unmodulated. Finally, the modulated and unmodulated wavelengths can be combined, or selected by an optical multiplexer.

First, Veselka is completely devoid of the concept of modulating a first signal and leaving a second signal unmodulated. The Examiner asserts that Veselka teaches "an optical coupler (76) having a first coupler input, a second coupler input and a coupler output, the first coupler input being coupled to the modulator output, the second coupler input being coupled to said second demultiplexer output (figure 7)." Applicants respectfully traverse the Examiner's assertion.

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Veselka teaches that every output from its demultiplexer is modulated. FIG. 7 of Veselka discloses the output 80 of the MWS 71 is preferably fed into wavelength-division demultiplexer 84, which separates each of the components of the MWS into single-wavelength optical output 74a-74d. Each output of the demux 74a-74d is fed into an optical modulator 75a-75d. Each modulator 75a-75d is fed with a separate data signal 78a-78d, one data signal per channel in the WDM system. The outputs of the modulators 75a-75d, each comprising a modulated optical signal representing one channel of data in the WDM system, are combined in a combiner 76 or wavelength multiplexer, and sent out over the optical fiber 77. (column 5, lines 30-41) Each output from the wavelength-division demultiplexer is fed to an optical modulator. Each input to the multiplexer of Veselka is a modulated optical signal.

Second, the Examiner concedes that Veselka does not disclose a mode-locked laser. The Examiner then argues that "[s]ince a multi-wavelength source laser of Veselka and a mode-locked semiconductor laser of Logan does the same function that is generating a mode-locked optical having wavelengths separated by approximately 10 GHz to approximately 300 GHz. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to replace a mode-locked semiconductor laser of Logan with a multi-wavelength source laser of Veselka."

In rejecting claims under 35 U.S.C. §103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the Examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), and to provide a reason why one having ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroval, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. Denied, 475 U.S. 1017 (1986); ACS Hosp. Sys., Inc. v. Montefiore Hosp. 732 F.2d 1572, 1577, 221 USPQ 929,

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933 (Fed. Cir. 1984). These showings by the Examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). Applicants respectfully submit that the Examiner fails to provide a prima facie factual basis to support the legal conclusion of obviousness.

The Examiner cites Logan to correct the deficiencies of Veselka. However, Logan and Veselka cannot properly be combined to arrive at the Applicants' invention.

First, Veselka's teachings are confined to particular embodiments using only a multi-wavelength source. Veselka notes the undesirability of using the mode-locked laser because "the mode-locked laser and optical resonator techniques require that the modulation frequency be an integer multiple of the free spectral range of the cavity, thereby, placing stringent requirements on the cavity length and modulation frequency." (Veselka, column 2, lines 19-23) Veselka specifically limits its teaching to multi-wavelength sources. Thus, Veselka teaches away from a combination with Logan since Logan specifically teaches the use of a mode-locked laser oscillator.

Second, Veselka teaches demultiplexing of a plurality of signals where every signal from the demultiplexer is modulated. At best, Logan takes a single signal, splits the single signal, and modulates one of the split signals. Thus, Veselka again teaches away from Logan. Therefore, there is no reasonable way to combine the references. Applicants respectfully submit that the Examiner is using impermissible hindsight to combine these references to make Applicants' invention obvious.

Since Veselka and Logan either individually or in any reasonable combination fail to disclose or suggest the claimed invention, it is respectfully submitted that the invention of claims 1, 5 and 6 are patentable over the cited references. Therefore, the Applicants submit that claims 1, 5 and 6, as they now stand, fully satisfy the requirements of 35 U.S.C. §103 and are patentable thereunder. Furthermore, dependent claims 3 and 4 depend from claim 1 and recite additional features therefore. At least for their dependency upon independent claim 1, the Applicants submit that claims 3 and 4 are not made obvious with respect to the teachings of Veselka and Logan. Therefore, the Applicants submit that dependent claims 3 and 4 also fully satisfy the requirements of 35 U.S.C. §103 and are patentable thereunder. As such, the

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Applicants request reconsideration and withdrawal of the obviousness rejection of claims 1, 3, 4, 5, and 6.

B. Claim 2

The Examiner rejected claim 2 as being unpatentable over the Veselka in view of Logan and further in view of Hohimer et al. (United States Patent No. 5,349,601, issued September 20, 1994) ("Hohimer"). The Applicants respectfully disagree.

The arguments previously presented with respect to Veselka and Logan in Section A are also applicable to and incorporated into the instant section. For brevity those arguments are not repeated. The combination of Veselka and Logan does not render Applicants' independent claim 1 unpatentable. In addition, claim 2 (which depends upon claim 1) contains all the features of claim 1. As such, Veselka and Logan either individually or in any reasonable combination does not render Applicants' claim 2 unpatentable.

Hohimer also does not teach or suggest optically generating signals using mode-locked radiation where a first output from an optical demultiplexer is modulated and a second output from the optical demultiplexer is unmodulated. Thus, this substantial gap is also not bridged by the teaching of Hohimer. Thus, the Examiner has failed to present a prima facie case of obviousness in combining Veselka, Logan, and Hohimer to arrive at the claimed invention.

Since the references, either singly or in combination, fail to disclose or suggest the claimed invention, it is respectfully submitted that the invention of claim 2 is patentable over the cited references. Therefore, the Applicants submit that claim 2 fully satisfies the requirements of 35 U.S.C. §103 and is patentable thereunder. As such, the Applicants request reconsideration and withdrawal of the obviousness rejection of claim 2.

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CONCLUSION

Thus, the Applicants submit that all of these claims now fully satisfy the requirements of 35 U.S.C. §103. Consequently, the Applicants believe that all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there are any unresolved issues requiring the maintenance of a final action in any of the claims now pending in the application, it is requested that the Examiner telephone Mr. Kin-Wah Tong, Esq. at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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Date


Kin-Wah Tong, Attorney
Reg. No. 39,400
(732) 530-9404
Moser, Patterson & Sheridan, LLP
595 Shrewsbury Avenue
Shrewsbury, New Jersey 07702